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Stemflow may be more famine than feast for forests' near-stem soil communities

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Stemflow, a precipitation and solute supply to soils near tree stems, plays a wide array of roles in ecosystem functioning. However, stemflow's ecohydrological functions have been primarily studied in forests with voluminous stemflow because resource subsidy is currently considered stemflow's principal impact on near-stem soils. This common assumption ignores controls that stemflow generation may exert via resource limitation (when stemflow < open rainfall). We synthesized selected literature across Earth's forests to evaluate the predominance of stemflow as a resource limitation to near-stem soils and characterize the concentrated, but meager, solute flux from low stemflow generators. Global observations of stemflow were highly skewed (skewness = 4.6) and leptokurtic (kurtosis = 28.8), where 69% of observations were $\leq$2% of rainfall. Stemflow $\leq$2% of rainfall is 10-100 times more chemically enriched than open rainfall, yet low volumes result in negligible solute fluxes (under 1 g m-2 y-1). Low stemflow may be the global and regional norm, creating persistently dry near-stem soils with infrequent, salty, and paltry precipitation flux if near-steam throughfall is negligible. Ignoring stemflow because it results in scarcity likely limits our understanding of ecosystem functioning as resource limitations alter the fate of soil nutrients, energy flows, and spatial patterning of biogeochemical processes.